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CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

REPORT
WINTER 1997

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Cooperative Conservation

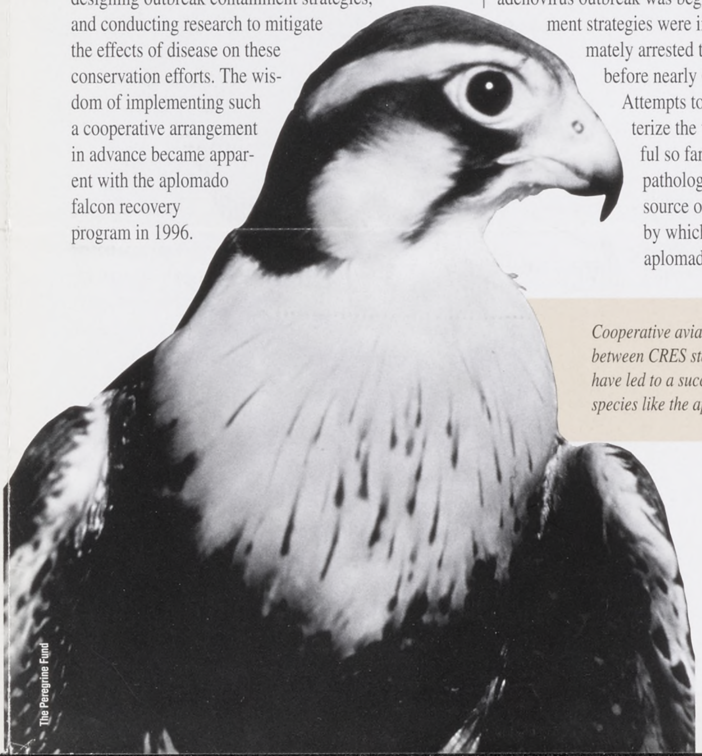
When it comes to large-scale propagation of endangered birds for recovery programs, nobody does it better than The Peregrine Fund. The Zoological Society of San Diego's Center for Reproduction of Endangered Species (CRES) and The Peregrine Fund (TPF) have formed a unique partnership in cooperative avian conservation. Participation by CRES staff involves both the pathology and behavior divisions in their collaboration at the World Center for Birds of Prey in Boise, Idaho, and at the Keauhou and Maui Bird Conservation Centers in Hawaii.

But even the best programs are occasionally faced with disease problems, because wherever animals are, diseases have a habit of popping up. The pathology division of CRES provides support for the conservation efforts of TPF by conducting disease investigations, designing outbreak containment strategies, and conducting research to mitigate the effects of disease on these conservation efforts. The wisdom of implementing such a cooperative arrangement in advance became apparent with the aplomado falcon recovery program in 1996.

The northern aplomado falcon is a small raptor that once roamed our southwestern grasslands but is now limited to scattered populations in northern Mexico. TPF has undertaken a recovery plan modeled after their successful approach for the recovery of the once critically endangered peregrine falcon. A breeding population of aplomado falcons has been established at TPF's World Center for Birds of Prey. The chicks produced there are reared to fledging age, then released in refuges in southern Texas. The success of this program is already apparent. In 1995, aplomado falcons nested in the United States for the first time in more than 40 years.

The recovery program experienced a significant setback in 1996, however, when chicks began dying without warning. A disease investigation was immediately conducted by CRES pathologists, revealing that an avian adenovirus outbreak was beginning. Emergency containment strategies were implemented—which ultimately arrested the outbreak—but not before nearly 60 chicks had died.

Attempts to isolate and further characterize the virus have been unsuccessful so far, but research continues as pathologists try to pin down the source of the virus and the means by which it gained access to the aplomado population.


The Peregrine Fund

Cooperative avian conservation efforts between CRES staff and The Peregrine Fund have led to a successful recovery plan for species like the aplomado falcon.

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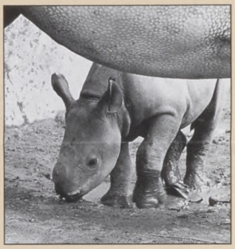
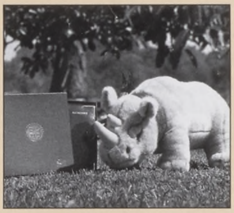

Black Rhino Calf
Virology studies to benefit black rhinos. See page 3.

Bonner Summer Student Fellows
College students work on CRES projects. See page 4.


Adopt a Rhino!
Holiday gifts that help CRES. See page 5.

Cooperative Conservation

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The Peregrine Fund

For the 1997 breeding season, pathologists worked with TPF propagation managers to implement new procedures designed to minimize the potential of another outbreak, as well as limit the impact of another outbreak should one occur. With these strategies in place, the 1997 season was the most successful in the history of the aplomado recovery program.

Reproduction is only one part of a successful captive-propagation program for captive-reared birds that are eventually destined for release into the wild. This phase is possibly the most difficult step, because captive-reared birds often lack important survival skills. The behavior division plans to aid TPF in preparing birds for life in the wild. In 1996, for example, behavior staff conducted a preliminary study to train and assess the foraging competence of the first captive-bred palila of Hawaii. Another important survival skill that could be assessed and enhanced by behavior staff is predator avoidance. In the future, the CRES behavior division staff hope to apply their methodology to aid TPF's captive propagation and release of other endangered Hawaiian forest bird species, such as the Maui parrotbill, the 'akohekohe, or crested honeycreeper, the puaiohi, or small Kauai thrush, and the Hawaiian creeper.

Since 1992, TPF and the Zoological Society of San Diego have been involved in saving Hawaiian forest birds. At first, this involved artificial incubation of eggs collected from the wild and hand rearing of the subsequent chicks. These were from endangered species such as the 'alala, or Hawaiian crow, and from more common Hawaiian passerines such as the large Hawaiian thrush, the iiwi, and amakihi. The common species acted as surrogates so that TPF staff could develop technologies for the propagation and release of small, critically endangered Hawaiian passerines such as the palila, a native Hawaiian honeycreeper. More recently, TPF's Hawaiian Forest Bird Recovery Program has begun to set up captive-breeding populations of several endangered Hawaiian birds, with the assistance of CRES behavior and pathology staff.

For the past two years, research by the CRES behavior division staff has primarily focused on the captive-breeding population of the Hawaiian crow. The captive population consists of six potential breeding pairs, of which five are actually producing fertile eggs. Of particular concern was the behavior of the birds during the time of egg laying. Past records on crow egg production indicated problems with cracked and broken eggs that may have been a result of mate incompatibility or inappropriate behavior on the part of the mated pairs. A program similar to the one used in the Wild Animal Park's California condor behavioral program was initiated for the Hawaiian crow. Birds were monitored daily at their nest platforms through the use of time-lapse video camera recordings.

From the tape reviews, we discovered that one member of each of four mated pairs exhibited excessive play behavior in and around the nest area. Such high level of play behavior in adult corvids is not only unusual but also puts eggs at risk, either by cooling through disturbance of the nesting female or by breaking. Play is usually restricted to young birds and is an important part of a crow's normal social development. Examination of past records revealed that the four birds that exhibited play behavior as adults had a socially deprived early life. Each of these birds had been the sole successful hatch of their year and thus had been reared without young crow companions. The eight remaining crows that exhibited little or no inappropriate play were hatched in years when several young crows were hatched out, and at least two were kept for the captive-breeding population.

This program is a good example of cooperative conservation at work. Our behavioral research not only aided the TPF staff in the day-to-day management by monitoring the behavior of breeding crows but also provided advice about ways to ensure that future additions to the captive breeding population will be socially well-adjusted crows.

—Bruce Rideout, D.V.M., Ph.D.
Director of Pathology/CRES
—Nancy Harvey, Ph.D.
Associate Behaviorist/CRES
—Susan Farabaugh, Ph.D.
Research Fellow/CRES

The Peregrine Fund

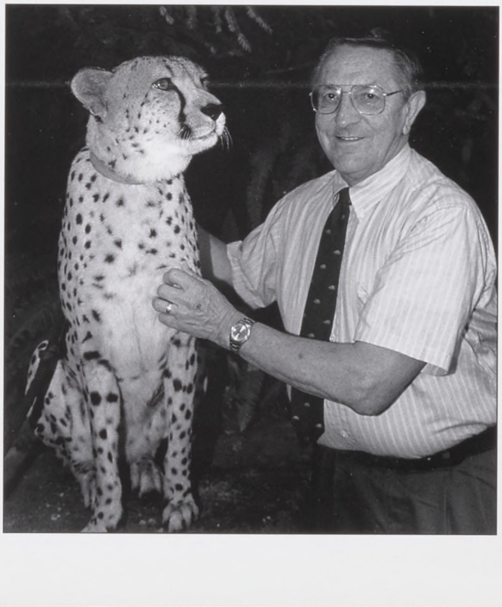
CRES pathologists work closely with TPF's Hawaiian Forest Bird Recovery Program to ensure that diseases do not hamper recovery efforts for critically endangered birds—such as the Hawaiian crow—while CRES behaviorists focus on reproductive behaviors.

Virology/ Immunology

As rhino populations decline worldwide, researchers are working with diseases that affect rhino species in captivity. In recent years, our understanding of the many factors involved in determining the resistance or susceptibility of a host animal to infectious agents has increased significantly. Some of these factors include the relative ratio of two types of white blood cells, genetic variation in specific immune response genes, and the presence of a gene that possibly determines which of two major types of immune responses an animal may produce upon infection. In addition, a minor change in the amino acid sequence of a protein found on immune system cells called macrophages may determine the relative level of natural resistance of a host to some pathogens. In collaboration with Dr. Jeff Stott and Myra Blanchard, immunologists at the School of Veterinary Medicine on the University of California at Davis campus, we are beginning to investigate some of these factors in the black rhinoceros. Some captive members of this species experience hemolytic disorders, fungal pneumonia, and immune complex disease. We believe that our efforts to understand just a few components of the rhinoceros immune system will eventually provide information concerning the immune status of individuals with these diseases and possibly a stronger basis for genetic management of the captive population.

Humane From Hollywood Honors Dr. Heuschele

Hollywood stars and animal friends turned out on August 16, 1997, to honor CRES Director Dr. Werner Heuschele, as well as actors and directors who have worked on behalf of animal welfare and wildlife conservation. This was the second annual fund-raiser for Humane From Hollywood, which benefits The Wild Foundation, Cheetah Conservation Fund, and Shambala Preserve, a 60-acre wild animal habitat in Soledad Canyon, near Acton, California, that is maintained by actress and conservationist Tippi Hedren through the nonprofit Roar Foundation.



With 50 years of service in the cause of wildlife, beginning with his days as a driver-guide at the San Diego Zoo in 1947, Dr. Heuschele was honored with a Distinguished Service Award. He became director of CRES in 1986 and has continued to work in the field of animal health and welfare and wildlife conservation worldwide.

Grants

The Center for Reproduction of Endangered Species is grateful to the following for their support of imperiled wildlife:

An **Anonymous** donor has made a grant in support of lion-tailed macaque behavioral research and repairs to the lion-tailed macaque corral at the Wild Animal Park. Trustee **Dr. Lee Monroe** and his wife, **Bobbie**, have made possible the purchase of a radio-controlled car that cheetahs can chase at the Wild Animal Park. The car will also be used in behavioral research of cheetah locomotion. The **L. J. Skaggs and Mary C. Skaggs Foundation** has made a grant in support of Dr. Barbara Durrant's work in conservation of endangered carnivores. Support for this research is also being provided by a grant from the **Morris Animal Foundation.**

1997 Bonner Summer Research Fellows

Since 1994, a number of promising young science students have benefited from the Bonner Summer College Student Fellowship Endowment Fund. Jewell H. and James T. Bonner established this fund to sponsor summer interns working on various research projects at CRES that are dedicated to the preservation and protection of wildlife. You can be a part of these endeavors by helping to sponsor one of our CRES summer interns. For more information, please call Amy Parrott in the San Diego Zoo's Development Office at (619) 685-3213.

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Eric Snook (left) worked in the pathology lab to determine if retroviruses have caused disease and death in koalas.

Arriving at CRES earlier this past summer, Eric Snook was handed a stack of data one foot high and asked to compile a database on koalas and the diseases they contract. For the past decade or so, researchers have noticed an interesting and peculiar pattern of disease and death in koalas. Recently, these patterns have been tentatively attributed to a retrovirus infection that causes immunosuppression and allows secondary infections, cancer, and degenerative diseases to develop—a similar process that affects people with AIDS or cats with feline leukemia virus.

Because the Zoological Society of San Diego has the largest collection of captive koalas outside of Australia, it offers a good study population. Eric performed a retrospective study of necropsy findings of all the koalas that have died within the last 37 years, in order to determine whether an underlying viral infection could possibly be associated with the increase in prevalence of lymphosarcoma, bone marrow aplasia, anemia, secondary infections, and osteochondromas in koalas. A similar spectrum of diseases has been seen in cats with retrovirus infections.

Formalin-fixed tissues from the most suspicious cases were examined by electron microscopy for anything that may resemble retrovirus particles. Although results are still pending, it appears that something out of the ordinary is occurring in these animals. We hope the cause can be determined, and, in the future, this information may be used to prevent these diseases.

Throughout the summer, Eric also did smaller, retrospective studies of necropsy findings in chameleons and slender-horned gazelles, learned how to perform a thorough postmortem examination, and broadened his knowledge in comparative anatomy. These skills will be invaluable to him this coming year, as he enters his first year of veterinary school at Iowa State University in the fall, and for the rest of his life as a veterinarian.

—Bruce Rideout, D.V.M., Ph.D.
Director of Pathology/CRES

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Kintea Bryant (above) worked with savanna monitor lizards in the ecology and endocrinology divisions, evaluating hormone levels that can be used to determine sex in certain reptile species.

Kintea Bryant is a recent graduate of the University of Colorado at Boulder's Environmental, Population, and Organismic Biology Program. Because she has broad interests in conservation, ecology, and reproduction of both captive and wild animals, she was ideally suited to participate in a collaborative project involving the ecology and endocrinology divisions of CRES. Her project this summer involved developing noninvasive techniques for monitoring reproductive function in monitor lizards.

In the past, conventional methods for obtaining reproductive endocrine data on reptiles have relied on analysis of serially collected blood samples. However, this approach is impractical for venomous species or those that are stressed by frequent handling. Noninvasive techniques for assessing steroid hormone levels have been developed for some birds and several mammals, but they have received little attention in reptiles. Refinement of such techniques for reptiles is potentially very useful, both for sexing individuals of species in which males and females are similar in appearance, and also for evaluating reproductive functions in species from which it is difficult to obtain blood samples over the course of an entire breeding season.

Using radioimmunoassay techniques, Kintea helped to develop methods for extracting steroid hormones from reptile fecal deposits. By monitoring hormone levels in this manner, she tracked seasonal changes throughout the reproductive cycle and investigated the potential utility of this technique for sexing juveniles. Because it does not require blood collection and results in no disruption of natural behavior, this technique should be especially valuable for studies of reproduction in sensitive species in the wild.

Initially, Kintea concentrated her efforts on savanna monitor lizards and Komodo dragons, but the methods she is helping to develop could also prove useful for a variety of endangered lizards, both in captivity and in the wild. As for her future, Kintea plans to attend graduate school. In the meantime, she wants to engage in a variety of research experiences to help focus her interests. We are happy to report that she has chosen to continue that process right here at CRES by continuing on as a part-time research assistant in the endocrinology division this winter.

—Allison Alberts, Ph.D.
Ecology Division Head/CRES

Adopt a Rhino for the Holidays!

You can "charge" into the season with one of the most unique gifts to be found while also helping endangered species. We are excited about our rhino babies, both at the Zoo and the Wild Animal Park, and are featuring them in our holiday special. Donations to the Adopt-An-Animal program help support the efforts of our researchers at CRES, where current studies include research on fertility and health issues for both captive and wild populations of rhinos. Adoption packages are appealing to all ages and include:

With your adoption of $99, you can choose *PACKAGE 1*:

- **A cuddly, 16-inch plush rhino decorated with a holiday ribbon**
- **A personalized adoption certificate with the name(s) of the proud parent(s)**
- **A subscription to *CRES Report***
- **A personalized gift card to announce your adoption**

AND

- **Two complimentary guest passes to the San Diego Zoo or the San Diego Wild Animal Park.**

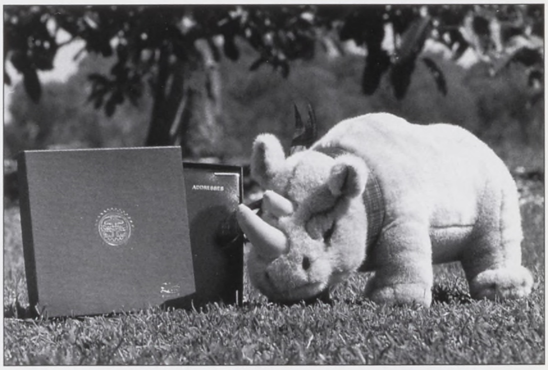
With your adoption of $99, you can choose *PACKAGE 2*:

- **A cuddly, 16-inch plush rhino decorated with a holiday ribbon**
- **A personalized adoption certificate with the name(s) of the proud parent(s)**
- **A subscription to *CRES Report***
- **A personalized gift card to announce your adoption**

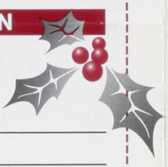
AND

- **An exclusive CRES address book in a handsome gift box (limited quantity).**

To order an adoption package or to receive a brochure, please call (619) 557-3974.



ANIMAL ADOPTION APPLICATION



☐ **YES,** I want to adopt a rhino for:

Choose: ☐ *PACKAGE 1* or ☐ *PACKAGE 2*

Name(s) ______________________________

Address ______________________________

City ____________________ State _____ Zip __________

Gift card message ______________________________

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Additional rhino adoption, *choose:* ☐ *PACKAGE 1* or ☐ *PACKAGE 2*

Name(s) ______________________________

Address ______________________________

City ____________________ State _____ Zip __________

Gift card message ______________________________

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Additional rhino adoption, *choose:* ☐ *PACKAGE 1* or ☐ *PACKAGE 2*

Name(s) ______________________________

Address ______________________________

City ____________________ State _____ Zip __________

Gift card message ______________________________

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Please make checks payable to the **Zoological Society of San Diego** and mail to: The Zoological Society of San Diego, Adopt-An-Animal Program, P.O. Box 271, San Diego, CA 92112.

OR, please charge my: ☐ MasterCard® ☐ VISA® ☐ Discover®

Card # ____________________ Exp. Date __________

Signature ______________________________

Donor Name (print) ______________________________

Daytime Phone # ______________________________

OR, you may charge your adoption by telephone: call (619) 557-3974 between 8 A.M. and 4 P.M., Monday through Friday.

Orders must reach the San Diego Zoo by December 16 to ensure delivery by Christmas.

(AHCR7)

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CRES "Wish List"

There is still much work that remains to be done as CRES scientists continue studies on reproduction, disease, and habitat conservation for endangered species. Current projects are in need of specialized equipment and supplies, which include:

- Data analysis lab: work-space trailer for the behavior division. To be used in giant panda and other behavior research projects - $50,000.
- Small gasoline-powered van for passengers and cargo, for use inside Zoo by all CRES divisions - $9,000.
- Refrigerator/freezer for new ecology lab. Needed to make possible the analyses of blood, fecal, and scent samples - $1,000.
- Spectrophotometer for endocrinology. This instrument will be used for biochemical assays, such as for glucose and proteins, and to standardize fecal samples - $6,400.
- Fischer Isotemp 49 cu. ft. refrigerator for pathology. Essential for daily laboratory functions - $4,750.
- Precision digital circulating waterbath, model 260, 5 gallon, for the cytogenetics division - $1,900.
- Perkin Elmer PCR system 9600 (thermal cycler) for molecular genetics - $9,995.
- Biological safety hood, Class II/B3, Forma Scientific, for the infectious diseases division. Essential for containment of potentially unsafe infectious agents involved in research - $7,681.
- Power Macintosh 9600/233 computer with monitor and keyboard for reproductive physiology. Updated software is necessary for analyzing data - $5,130.
- Rainin electronic digital pipette and Eppendorf repeater pipettes for endocrinology. Used daily for precise measurement during assay procedures - $2,000.
- Refrigerated microcentrifuge for infectious diseases division. For handling sensitive biological samples, including DNA, RNA, and protein from a variety of sources - $8,800.
- DNA fluorometer and accessories. Essential to quantitate DNA resulting from PCR, for example, or extraction procedures in the molecular biology lab - $3,759.
- Shaker-incubator for infectious diseases division. For amplifying bacterial plasmids (cloned DNA) and recombinant protein from a variety of sources for vaccine - $8,000.

CRES REPORT
CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

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